(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 878 444 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.11.1998 Bulletin 1998/47

(51) Int. Cl.[6]: **C02F 3/02**

(21) Application number: **98108512.9**

(22) Date of filing: **11.05.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **12.05.1997 CR 554697**

(71) Applicant:
Bortolozzo, Luigi Bruso'
San Jose (CR)

(72) Inventor:
Bortolozzo, Luigi Bruso'
San Jose (CR)

(74) Representative: **Cioni, Carlo**
c/o STUDIO CIONI & PIPPARELLI
Viale Caldara 38
20122 Milano (IT)

(54) Bio-depurator

(57) A premanufactured biological depurator, which consists of an ensemble of premanufactured elements, in high resistance concrete, light, of elongated octagonal design, comprising a bottom element (1), one ore more superimposed ring elements (3) and top elements (2), a vertical partition (4) being provided inside the depurator to divide the internal volume of the depurator in two sectors (SECTOR I, SECTOR II), said vertical partition being equipped with a passage duct (Fig 4, 4A and 4B) to allow the treated water passing fro one sector to the other a flow control device (Control-flug - Fig. 3 and 3A) being installed at the exit of the depurator to allow last solid trace separation from outgoing liquids.

The biological depurator can be applied for the treatment of sewage of houses, commercial premises, restaurants, hotels.

The biological depurator is of easy handling and transportation and it can be installed in any location.

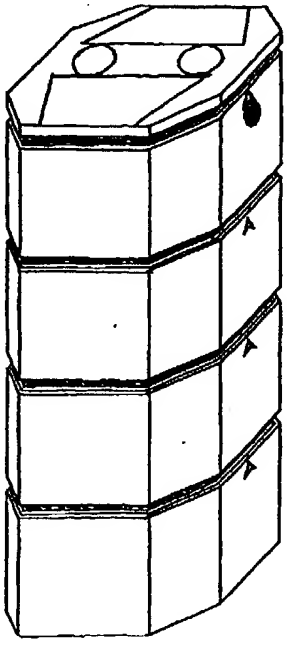


FIG. 1

EP 0 878 444 A1

Description

This is a premanufactured biological depurator, with an elongated octagonal shape, with polygonal variants, of variable size, constituted by various modular elements, inside of which are placed other elements of a lesser size. All the external elements are premanufactured in special concrete of high resistance; while the internal elements can be manufactured in concrete, glass fiber, plastic PVC lamina, and also it can be used fiber-cement lamina for the internal separation.

The aforementioned elements, once assembled between them, form a recipient which has the function to obtain the depuration of the sewage in a continuous process.

This invention will be applied for the treatment of the sewage of the houses, buildings, commercial premises, restaurants, hotels, cabins, huts, ect.

The current technology at the level of civil works, in the majority of the cases, when it is desired to obtain high levels of efficiency with an important reduction of B.O.D.5 at the exit of the depurator, it uses tanks with various sectors (3-4) with a final amount of air through bumps.

In Costa Rica, at the level of depurators, there are in the market treatment plants of diverse sizes, of high costs, in which are used mechanical devices, and which require a continuous maintenance and functioning expenses.

In virtue of above reasons, taking advantage of my experience of many years, and with the purpose to reduce costs in installations, functioning and maintenance, and at the same time to extend the use of devices of high efficiency, always having in mind the conservation of the natural environment, I present this invention called bio-depurator.

My invention, part of the basic idea, to construct a depurator, small, light to make easier its handling and transportation, is of easy installation, premanufactured in concrete, modular and with a high efficiency, to be installed where such features are required, as for instance: in houses, hotels, commercial premises in the beaches, located in lands in which it is not possible to install septic tanks. Another of the characteristics are identifiable in the fact that there is no need of mechanical devices, nor expenses due to its use and maintenance.

The description of the invention shall be made with reference to the attached drawings that are not to be interpreted as limitative of the scope of the invention itself.

Figure 1 is a perspective view of an embodiment of the Bio-depurator according to the invention;
Figure 2 is a cross-section through a vertical plane of the Bio-depurator of Fig. 1;
Figures 3 and 4 illustrate in detail two operating elements of Bio-depurator of Fig. 2, namely, the exit Flow control device (Control-flug) and a passage duct, respectively
Figure 5 is a cross-section through A - A of the Bio-depurator of Fig. 2;
Figure 3A is a different view of the Control-flug of Fig. 3A;
Figure 4A and 4B are different views of the passage duct of Fig. 4;
Figure 3B is a different embodiment of the Control-flug whose external wall are coincident with a portion of the Bio-depurator internal wall;
Figures 6 and 7 illustrate two different embodiments of the Bio-depurator having different sizes;
Figures 6A and 7A are cross-sections of the Bio-depurator of Figure 6 and 7, respectively
Figures 8 and 8A show a further embodiment of Bio-depurator in which the Control-flug of Fig. 3B is installed.

- The basic structure of the depurator is formed by three main elements complementary one to the others: element of bottom (1); rings (2); superior element (3) (see Fig. 2, Fig 6, Fig 7 and Fig 8); in every point of junction, a profile to ensure the assembling must be foreseen.
- The design of the external part of the depurator has an elongated octagonal shape, to make the handling in an inclined land and the stability easier, during the transportation.
- For its functioning (aerobic fermentation) has been foreseen in the superior element (3), a hole of 25 mm where is inserted the tube for the ventilation.
- As a separation between the first sector (SECTOR I) and the second one (SECTOR II), there exist fiber-cement laminas (4) also modular.
- For the passage of the waters under treatment from one sector to the other one, one of the separation laminas has a special duct for the passage of the fluid (Fig 4, 4A Fig. 4B). Such passage duct can be advantageously made of PVC material.
- To form the entrance duct, together with an element separator of foams, it has been designed a trapezoidal element 5 of concrete (Fig. 5A, 6A, 7A and 8A).
- To complete the depuration, before the exit, it has been designed a device of stagnation and decantation (Control-flug, Fig. 3A) made of PVC, and whenever possible, will be used an element of concrete (Fig 3B), which linked to the walls of the superior element of the depurator, will obtain the same former conformation (Fig. 8A).
- To complete the depurator, it was designed a lid 6 with two little lids 6A and 6B which correspond, one to the sector

of the entrance, and the other one to the sector of the exit; the above serve for any inspection, or if necessary, to clean it.

The process of treatment of the sewage starts with the entrance of the same in SECTOR I of the Bio-depurator through a trapezoidal duct 5, placed in a superior element 2, which oblige them to enter down the surface of the internal liquid. Once they same go out of the duct, they separate in the liquid mass, with the characteristic to get separated at different levels, as per its weight. The light solids come closer to the surface, where they make contact with the air; the heavy solids will be deposited in the bottom; while the intermediate part will keep almost clean.

The parts which fall down in the bottom discompose themselves, due to the anaerobian fermentation, leave in the bottom their mineral parts, while the gases go up towards the surface, where they will be expelled through the ventilation tube.

The light parts which are in the superior part of the liquid, undergo an aerobic fermentation because of the bacterial fiber (microscopic fungus) with a production of gases and heavy particles, which will fall down in the bottom, completing the process with an oxidation of the larger part.

The medium part of the waters will be kept almost clean, and in this last layer are those which through the device of Fig 4, 4A and 4B, will pass to the SECTOR II, where once again they will separate, leaving an intermediate layer, even cleaner.

In SECTOR II will develop once again anaerobian and aerobic fermentations, in a more diluted environment, with formation of gases and oxidation. From the medium part of the second SECTOR II (this time even larger), the water almost clean will enter in the Control-Flug, Fig. 3, 3A and 3B, where afterwards it will stagnate, will drop the rest of the few solids, and contemporaneously will oxidate more.

With the entrance in the depurator of a new amount of water, the one present in the central part f the Control-Flug will be set forward, through the exit hole out of the depurator.

When the water goes down in the depurator, the water present in the side sectors of the Control-Flug will pass to central sector, waiting for a new outflow.

As it can be understood, the Control-Flug is a very important piece in the depurator's functioning, since due to its shape it avoids the fluid movements and allows a successive aerobic fermentation, to complement the former fermentations.

The waters leaving the depurator are practically deprived of the solid particles, and with a very low value of polluted substances (B.O.D.5).

The main characteristics of this depurator are: the optimal efficiency, the ample scale of sizes as it has been show in Fig. 2, 6, 7), the lack of expenses of use and maintenance (once installed and correctly used, it does not need any expenses nor maintenance whatsoever), its reduced dimensions, the lightness of its parts, the facility of its handling and transportation, the fastness of assembling and possibility, if there are weight problems, to construct the internal elements in lamina of PVC or in glass fiber.

The characteristics of Bio-depurator are listed in Table 1 wherein the first column refers to the type of Bio-depurator (Bio-dep 10 comprising only one ring, Bio-dep 15 comprising 2 rings, Bio-dep 20 comprising 3 rings and Bio-dep 25 comprising 3 rings).

TABLE I

Type	Size	No. of users	Useful capacity in liters	Maximum external measure	Total height	Height of each element	Minimum prefundity entry	Minimum profondity exit
Bio-Dep.10	reduced	10	850	0,81 x 1,01	1,68	0,515	23	28
Bio-Dep.15	normal	15	1,165	0,81 x 1,01	2,19	0,515	23	28
Bio-Dep.20	with 1 ring	20	1,490	0,81 x 1,01	2,71	0,515	23	28
Bio-Dep.25	with 2 rings	25	1,815	0,81 x 1,01	3,22	0,515	23	28
Bottom Element	normal	=	335	0,81 x 1,01	=	0,58	=	=

Claims

1. A premanufactured biological depurator, which consists of an ensemble of premanufactured elements, in high resistance concrete, light, of elongated octagonal design, which assembled give form to the depurator.

2. A premanufactured biological depurator according to claim 1, characterized in that the octagonal design and polygonal variants of the depurator, allows the handling and secure stop of every piece on by of a sole man.

3. A premanufactured biological depurator according to claim 1, characterized in that the complementary elements of the depurator comprise the Control-Flug (Fig 3, 3A) which can be produced in lamina of PVC or in concrete (Fig. 3b).and duct of passage of fluid between the two sectors (Fig 4, 4A and 4B) formed by internal separation laminas 4 which can be made of fiber-cement, PVC or glass fiber.

4. A premanufactured biological depurator consisting of an ensemble of premanufactured elements according to claim 1, characterized in that it consists of a bottom element (1), one ore more superimposed ring elements (3) and a top element (2), a vertical partition (4) being provided inside the depurator to divide the internal volume of the depurator in two sectors (SECTOR I, SECTOR II), said vertical partition being equipped with a passage duct (Fig 4, 4A and 4B) to allow the treated waters passing from one sector to the other, a flow control device (Control-flug - Fig. 3 and 3A) being installed at the exit of the depurator to allow last solid trace separation from outgoing liquids.

5. A premanufactured biological depurator according to claim 4 characterized in that the liquid inlet duct has a trapezoidal form (5) and is located at a lower level with respect to the surface of the liquid inside the depurator.

6. A premanufactured biological depurator according to claim 4 characterized in that the external wall of the Control-flug is a portion of the wall of Bio-depurator top part.

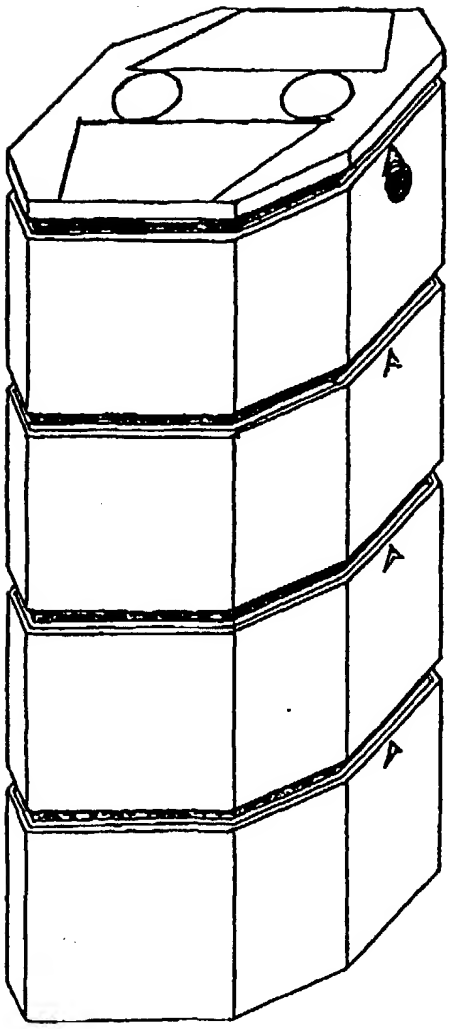


FIG. 1

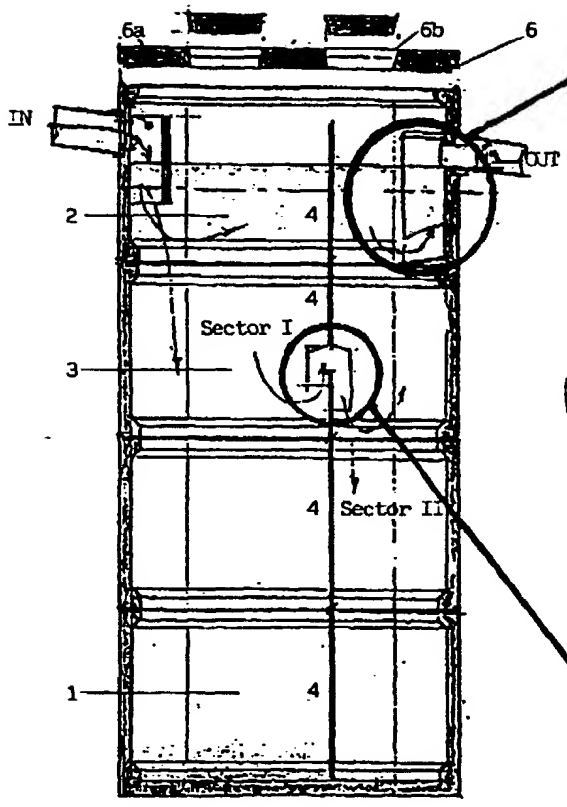


FIG. 2

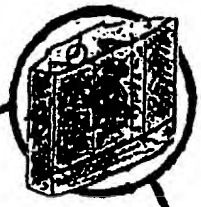


FIG. 3

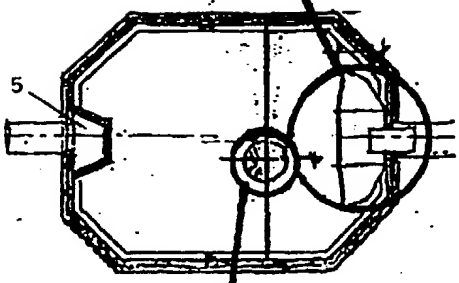


FIG. 5

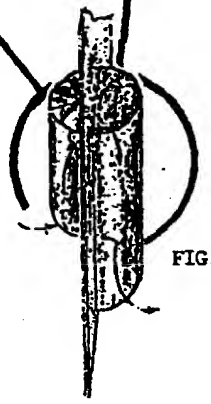


FIG. 4

FIG. 4b

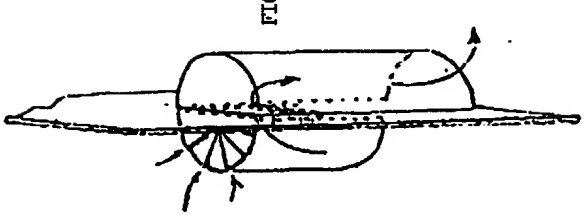


FIG. 4a

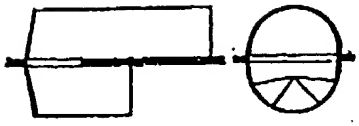


FIG. 3a

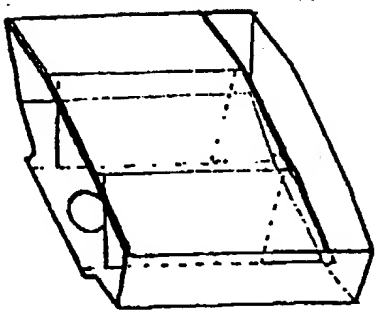
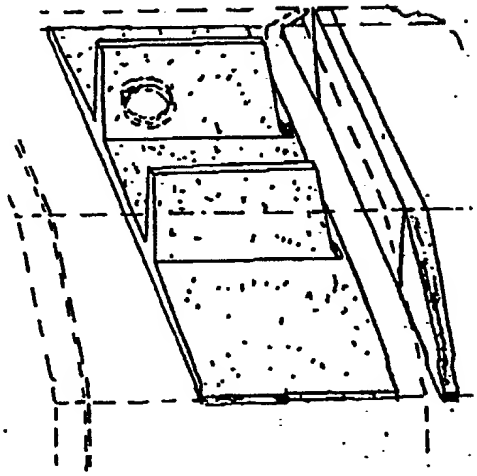


FIG. 3b



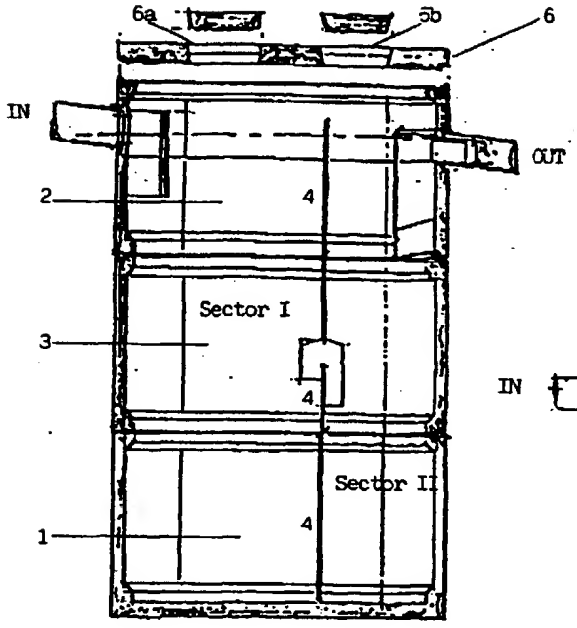


FIG. 6

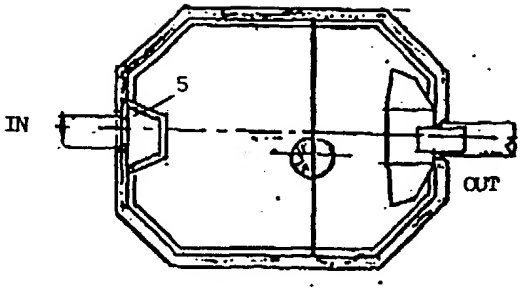


FIG. 6a

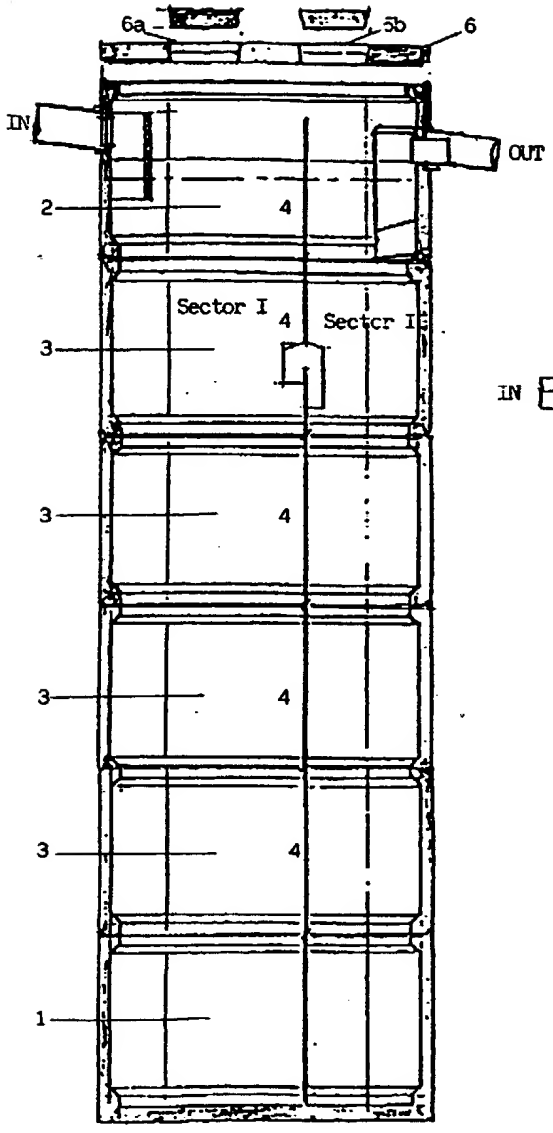


FIG. 7

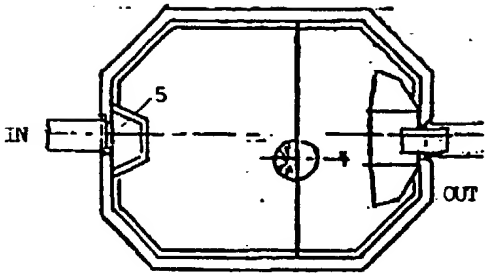


FIG. 7a

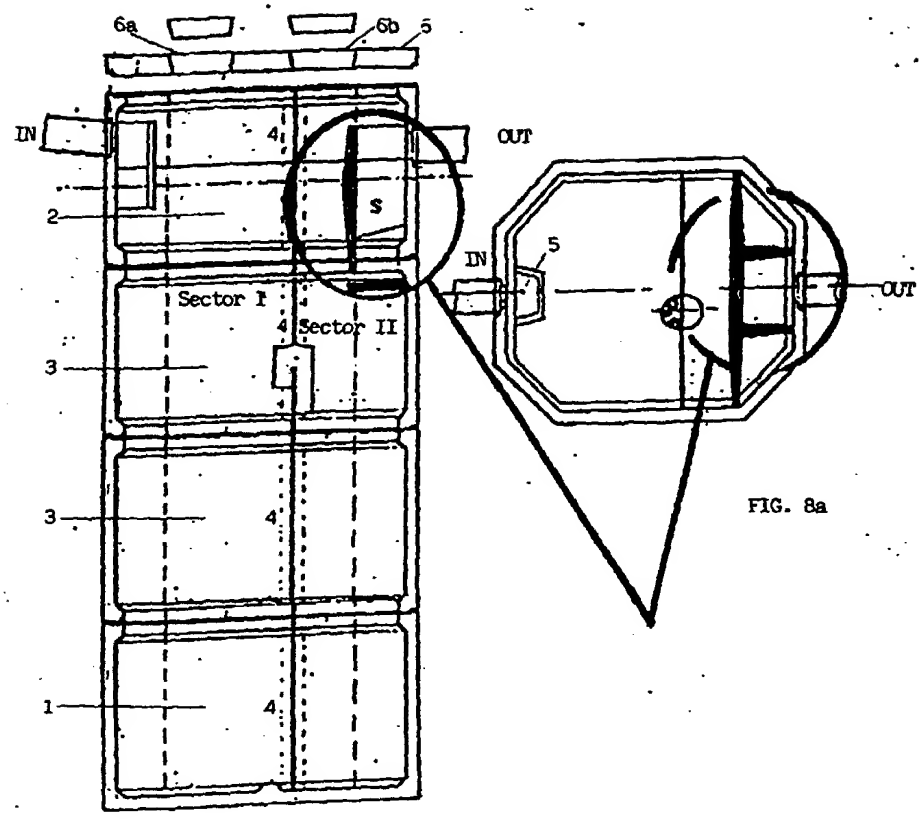


FIG. 8a

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 10 8512

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB 2 276 617 A (ZHOU JITI) 5 October 1994 * page 1, paragraph 4; figure 2 *	1,2	C02F3/02
A	EP 0 555 743 A (DYCKERHOFF & WIDMANN AG) 18 August 1993 * the whole document *	1,3-5	
A	DE 27 05 732 A (KUNSTSTOFFTECHNIK GMBH U CO VE) 24 August 1978 * claims 4-7; figures 1,2 *	1,2,4	
A	DE 195 11 159 C (KUNZ PETER M PROF DR) 5 December 1996 * column 2, line 49-54; figure 1 *	1,4	
A	DE 87 04 522 U (OPATCO AG) 26 November 1987 * claims 1,6; figure 1 *	1,2,4	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

C02F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 September 1998	Gruber, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)